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PATENT ABSTRACTS OF JAPAN

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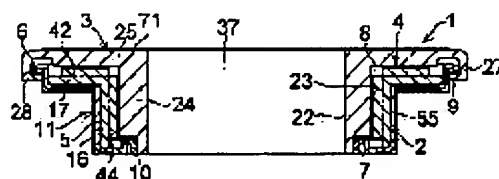
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(54) SLIDING BEARING MADE OF SYNTHETIC RESIN

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a sliding bearing made of synthetic resin, capable of maintaining smooth steering during steering operation over a long period of time without lowering a sliding characteristic caused by the entry of dust or the like by positively preventing the entry of dust or the like to a sliding surface by a sealing means, and mounting the sealing means so as not to easily fall due to vibration or the like.

SOLUTION: This sliding bearing 1 made of synthetic resin is provided with a lower case 2 made of synthetic resin, an upper case 3 made of synthetic resin and placed over the lower case 2, a sliding bearing means 4 made of synthetic resin and disposed in a space 8 between the upper and lower cases 3, 2, and an elastic sealing means 11 disposed covering an outer surface 5 of the lower case 2 and closing the outside of the space 8 and inner annular openings 9, 10 between the upper and lower cases 3, 2 at both annular end parts 6, 7.



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CLAIMS

[Claim(s)]

[Claim 1] Plain bearing possessing a plain-bearing means made of synthetic resin allotted between lower housing made of synthetic resin, upper housing made of synthetic resin put on this lower housing, and the upper part and lower housing, and an elastic seal means which covers external surface of lower housing, is allotted and blockaded an outside and inside annular opening of space between the lower part and upper housing at the edge annular [both] made of synthetic resin.

[Claim 2] An outside body characterized by providing the following is provided. An elastic seal means The main part section which covered an annular end face connected [peripheral face / of a cylinder part / of lower housing / a peripheral face and this peripheral face / an annular end-face list it connects / end face] at the annular Itabe's first annular lateral surface and this annular lateral surface, Plain bearing possessing the inside elastic lip section which is formed in the outside end section of this main part section in one, is formed in the outside elastic lip section which blockades an outside annular opening, and the inside end section of the main part section in one, and blockades an inside annular opening made of synthetic resin according to claim 1 Lower housing is a cylinder part with cylinder-like inner skin. the first annular Itabe formed in the end section of this cylinder part in one -- having -- **** -- upper housing -- inner skin of a cylinder part of lower housing -- said -- an inside body which has **** inner skin and a **** peripheral face, and was allotted in a cylinder part of lower housing Second annular Itabe formed in the end section of this inside body in one it forms in this second annular Itabe's annular periphery edge in one -- having -- **** -- inner skin of a cylinder part of lower housing -- said -- **** inner skin

[Claim 3] A plain-bearing means is plain bearing equipped with thrust plain bearing allotted between the first annular Itabe of lower housing, and the second annular Itabe of upper housing, and radial plain bearing allotted between a cylinder part of lower housing, and an inside body of upper housing made of synthetic resin according to claim 2.

[Claim 4] It is plain bearing made of synthetic resin according to claim 2 or 3 with which the inside elastic lip section touches an inside body of upper housing elastically in the annular inside end section by the outside elastic lip section's being the annular outside end section, and being elastically in contact with an outside body of upper housing.

[Claim 5] It is plain bearing made of synthetic resin given in any 1 term of claims 2-4 which the main part section possesses a core bar member in an elastic seal means, and each of an outside and the inside elastic lip section becomes from elastic material.

[Claim 6] It is plain bearing made of synthetic resin according to claim 5 which a core bar member covers the annular Itabe's first annular lateral surface and annular end face in a peripheral face and an annular end-face list of a cylinder part of lower housing, is extended in them, and is covered by elastic material, and each elastic material of an outside and the inside elastic lip section is extended from elastic material which covered a core bar member, and is in one with the elastic material concerned.

[Claim 7] A plain-bearing means is plain bearing made of synthetic resin given in any 1 term of claims 1-6 currently formed in either [at least] lower housing or upper housing in one.

[Claim 8] A plain-bearing means is plain bearing made of synthetic resin given in any 1 term of claims 1-6 currently formed in another object to lower housing and upper housing.

[Claim 9] Plain bearing made of synthetic resin given in any 1 term of claims 1-8 by which eye a grease sump is formed in a plain-bearing means.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] About plain bearing made of synthetic resin, in more detail, this invention is included in the strut type suspension (MAKUFASO type) in a four-wheel car, and relates to suitable plain bearing made of synthetic resin.

[0002]

[Problem(s) to be Solved by the Invention] The strut type suspension used for the front wheel of a four-wheel car has the structure which combined the coil spring with the strut assembly which generally built in the hydraulic shock absorber in the outer case which became one-like with the main shaft. In this Sas ** NSHON, in case a strut assembly turns with a coil spring in steering actuation, there is a thing of the format around which the piston rod of a strut assembly turns, and the format around which a piston rod does not turn, but between the attachment member of the body, and the up spring seat sheet of a coil spring, it rolls, it replaces with a ball bearing and plain bearing made of synthetic resin may be used in order to permit rotation of a strut assembly smoothly also in which format.

[0003] Although plain bearing made of synthetic resin usually possesses the lower housing made of synthetic resin, and the upper housing made of synthetic resin put on this lower housing and comes to allot a plain-bearing member or a plain-bearing projected part to the space between these lower housing and upper housing, when dust, muddy water, etc. trespass upon this space, it has a possibility that a desired bearing function may no longer be obtained. On the other hand, since the part which carries out a direct action is equipped with dust, muddy water, etc. during vehicle transit, a strut type suspension becomes what also has the very severe operating environment of plain bearing with which it is equipped between the attachment member of the body, and the up spring seat sheet of a coil spring. Therefore, if the periphery [of the space where the plain-bearing member or the plain-bearing projected part was allotted], and inner circumference side is carrying out the opening outside directly, the risk of invasion to space, such as dust from here and muddy water, will become very high, and sealing performance here will become very important. In order to prevent stagnation of the moisture in space etc. especially, in plain bearing made of synthetic resin which was made to carry out the opening of the inner circumference side of space caudad, and formed lower housing and upper housing, the above-mentioned risk becomes still higher.

[0004] In addition, easily, since parts where vibration is very intense, such as a front wheel of an automobile, are equipped with plain bearing made of synthetic resin as mentioned above, from a seal means to blockade opening of the space concerned in order to prevent invasion to space, such as dust and muddy water, it is required by vibration etc. that opening of space should be firmly equipped with it so that there may be no dedropping.

[0005] This invention is made in view of said many points. With a seal means Can prevent invasion of the dust to a sliding surface etc. certainly, do not produce the fall of the sliding property resulting from invasion of dust etc., and, moreover, it ** by vibration etc. by the ability equipping with a seal means easily, so that there may be no dedropping. It aims at obtaining plain bearing made of synthetic resin

which can maintain smooth steering at the time of steering actuation over a long period of time.

[0006]

[Means for Solving the Problem] Plain bearing made of synthetic resin of the first mode of this invention possesses a plain-bearing means made of synthetic resin allotted between lower housing made of synthetic resin, upper housing made of synthetic resin put on this lower housing, and the upper part and lower housing, and an elastic seal means which covers external surface of lower housing, is allotted and blockaded an outside and inside annular opening of space between the lower part and upper housing at the edge annular [both].

[0007] Since according to plain bearing of the first mode an elastic seal means to blockade an outside and inside annular opening of space between the upper part and lower housing covers a peripheral face of lower housing and is allotted at the edge annular [both] If plain bearing is attached between an attachment member of the body, and an up spring seat sheet of a coil spring As a result of fixing an elastic seal means to a washer installed on an up spring seat sheet or an up spring seat sheet firmly, omission of an elastic seal means can be prevented certainly. Moreover, with the elastic seal means concerned Invasion of dust to a sliding surface etc. can be prevented certainly, it produces a fall of a sliding property resulting from invasion of dust etc. and **, and smooth steering at the time of steering actuation can be maintained over a long period of time.

[0008] In plain bearing made of synthetic resin of the second mode of this invention In plain bearing of the first mode lower housing It has a cylinder part with cylinder-like inner skin, and the first annular Itabe formed in the end section of this cylinder part in one. Upper housing inner skin of a cylinder part of lower housing -- said -- it having **** inner skin and a **** peripheral face, and with an inside body allotted in a cylinder part of lower housing It is formed in an annular periphery edge of the second annular Itabe formed in the end section of this inside body in one, and this second annular Itabe in one. An outside body with **** inner skin is provided. inner skin of a cylinder part of lower housing -- said - - an elastic seal means The main part section which covered an annular end face connected [peripheral face / of a cylinder part / of lower housing / a peripheral face and this peripheral face / an annular end-face list it connects / end face] at the annular Itabe's first annular lateral surface and this annular lateral surface, It is formed in the outside end section of this main part section in one, and it is formed in the outside elastic lip section which blockades an outside annular opening, and the inside end section of the main part section in one, and the inside elastic lip section which blockades an inside annular opening is provided.

[0009] Since the inside of the main part section which covered the annular Itabe's first annular lateral surface and annular end face in a peripheral face and an annular end-face list of a cylinder part of lower housing, the inside annular in the outside end section, and the outside elastic lip section are formed according to plain bearing of the second mode, seal of an outside and inside annular opening can be made nearly perfect by elastic contact to this inside, the inside of upper housing of the outside elastic lip section, and an outside body.

[0010] In plain bearing made of synthetic resin of the third mode of this invention, a plain-bearing means is equipped with thrust plain bearing allotted between the first annular Itabe of lower housing, and the second annular Itabe of upper housing, and radial plain bearing allotted between a cylinder part of lower housing, and an inside body of upper housing in plain bearing of the second mode.

[0011] In plain bearing of the third mode thrust plain bearing Even if it forms in either [at least] the first annular Itabe or the second annular Itabe in one It may replace with this and you may form in another object at least to one side of them, and similarly, even if it also forms radial plain bearing in either [at least] a cylinder part or the inside bodies in one, it may be replaced with this and may be formed in another object at least to one side of them.

[0012] By plain bearing made of synthetic resin of the fourth mode of this invention, in plain bearing of the second or third mode, the outside elastic lip section is the annular outside end section, it is elastically in contact with an outside body of upper housing, and the inside elastic lip section touches an inside body of upper housing elastically in the annular inside end section.

[0013] In plain bearing made of synthetic resin of the fifth mode of this invention, in plain bearing of the

second to fourth one of modes, the main part section of an elastic seal means possesses a core bar member, and an outside of an elastic seal means and each of the inside elastic lip section consist of elastic material.

[0014] In plain bearing of the fifth mode, a core bar member covers the annular Itabe's first annular lateral surface and annular end face in a peripheral face and an annular end-face list of a cylinder part of lower housing, is extended in them, and it is covered with plain bearing made of synthetic resin of the sixth mode of this invention by elastic material, and each elastic material of an outside and the inside elastic lip section is extended from elastic material which covered a core bar member, and is in one with the elastic material concerned.

[0015] In plain bearing of the fifth mode of this invention, an elastic seal means possesses a core bar member, and an outside and the inside elastic lip section consist of elastic material. In plain bearing of the sixth mode Since it consists of elastic material extended in one from elastic material with which a core bar member which covered external surface of lower housing was covered with elastic material, and each of an outside and the inside elastic lip section covered a core bar member It can arrange without giving an elastic seal means to external surface of lower housing, and seal of an outside and inside annular opening can be attained nearly completely as an outside which consists of elastic material, and the inside elastic lip section are moreover also. As elastic material, plastics elastomers, such as rubber elasticity objects, such as natural rubber and synthetic rubber, or polyester, and polyurethane, are used.

[0016] Even if it forms a plain-bearing means in either [at least] lower housing or upper housing in one and forms it in it like plain bearing of the seventh mode in this invention You may form and prepare in another object to lower housing and upper housing like plain bearing of the eighth mode. Here When it constitutes a plain-bearing means from thrust plain bearing and radial plain bearing, like the third mode, in one, these may also be formed in formation or another object, and may be prepared in either [at least] lower housing or upper housing. Furthermore, for a plain-bearing means, like plain bearing of the ninth mode, eye a grease sump may be formed, if grease is arranged and used for eye this grease sump, it can continue and the further smooth steering at the time of steering actuation can be obtained at a long period of time.

[0017] As for synthetic resin which constitutes the upper part and lower housing in this invention, it is desirable to excel in a sliding property and mechanical properties, such as abrasion resistance, shock resistance, and creep resistance, as for especially synthetic resin that constitutes a plain-bearing means allotted between the upper part and lower housing, it is desirable to have self-lubricity, polyolefin resin, such as polyester resin, such as polyacetal resin, polyamide resin, and polybutylene terephthalate (PBT), polyethylene, and polypropylene, etc. is used good, in addition polycarbonate resin etc. can be used.

[0018] Although synthetic resin which constitutes a plain-bearing means, and same synthetic resin may be used for the upper part and lower housing, it is the combination with good synthetic resin and friction property used especially for a plain-bearing means, and it is moreover comparatively desirable that it is rigid high synthetic resin. When it illustrates about the desirable combination, there are combination of polyacetal and a polyamide, combination of polyethylene and polyacetal, combination of polyacetal and PBT, and combination of polyacetal and polyacetal to a plain-bearing means, the upper part, and lower housing.

[0019] In addition, a labyrinth seal means may be further formed at least in one side of an outside and inside annular opening, and one [at least] sealing performance by the side of a periphery and inner circumference may be further raised by in collaboration with this labyrinth seal means and an elastic seal means.

[0020] Next, this invention is further explained to details based on an example of a gestalt of desirable operation shown in drawing. This invention is not limited to these examples at all.

[0021]

[Embodiment of the Invention] In drawing 4 from drawing 1 the plain bearing 1 made of the synthetic resin of this example The lower housing 2 made of synthetic resin, and the upper housing 3 made of synthetic resin put on lower housing 2, The plain-bearing means 4 made of synthetic resin allotted to the

upper part, lower housing 2, and the space 8 between three, The external surface 5 of lower housing 2 is covered, it is allotted, and the elastic seal means 11 which blockaded the outside and inside annular openings 9 and 10 of space 8 between the upper part, lower housing 2, and 3 at the edges 6 and 7 annular [both] is provided.

[0022] Lower housing is equipped with the cylinder part 16 with the inner skin 15 of the shape of 2 and a cylinder, and annular Itabe 17 formed in the end section of a cylinder part 16 in one.

[0023] It has **** inner skin 22 and a **** peripheral face 23. upper housing 3 -- the inner skin 15 of the cylinder part 16 of lower housing 2 -- said -- With the inside body 24 allotted in the cylinder part 16 of lower housing 2, and annular Itabe 25 formed in the end section of the inside body 24 in one it forms in annular Itabe's 25 annular periphery section in one -- having -- **** -- the inner skin 15 of the cylinder part 16 of lower housing 2 -- said -- it has the outside body 27 with the **** inner skin 26, and the annular projection 28 which projected to the method of the inside of the direction of a path, and was formed in the inner skin 26 of the outside body 27 in one.

[0024] The inside body 24 consists of the thick-cylinder section 31 and the thin cylinder section 32, and a peripheral face 23 consists of a peripheral face 33 of the thick-cylinder section 31, and a peripheral face 34 of the thin cylinder section 32. The inner skin 22 of the inside body 24 has specified the insertion hole 37 with which the piston rod 36 of a strut assembly shown in drawing 5 is inserted.

[0025] The annular thrust plain bearing 42 which the plain-bearing means 4 was allotted between annular Itabe 17 of lower housing 2, and annular Itabe 25 of upper housing 3, and projected to shaft orientations and was formed in annular Itabe's 17 annular medial surface 41 in one, It is allotted between the cylinder part 16 of lower housing 2, and the inside body 24 of upper housing 3. It has the radial plain bearing 44 of the shape of a cylinder which projected to the direction inboard of a path and was formed in the inner skin 15 of a cylinder part 16 in one. The protrusion circumferentia 45 of the thrust plain bearing 42 It is in contact so that sliding of one annular side (annular inside) 46 of annular Itabe 25 may be attained, and the protrusion cylinder side 47 of the shape of a cylinder of the radial plain bearing 44 touches so that sliding may become free at the peripheral face 33 of the shape of a cylinder of the thick-cylinder section 31.

[0026] in the plain-bearing means 4, two or more slots 48 as [are extended in the radiation direction to the protrusion circumferentia 45] a grease sump are extended to shaft orientations in the protrusion cylinder side 47 -- similarly two or more slots 49 as a grease sump are formed in the angle direction at equal intervals, respectively.

[0027] The main part section 55 which covered the annular end face 54 which connects [peripheral face / of a cylinder part 16 / cylinder-like / of lower housing 2 / the peripheral face 51 and peripheral face 51 / the annular end-face it connects / end face / 52 list] the elastic seal means 11 at annular Itabe's 17 annular lateral surface 53 and annular lateral surface 53, Are turned up from the annular outside end section 56 of the main part section 55, and expand the diameter gradually and it is extended so that the outside annular opening 9 may be blockaded. The tip 57 which is the annular outside end section touches the inner skin 26 of the outside body 27 elastically. So that it may be the main part section 55 and the same axle, may be formed in the outside end section 56 of the main part section 55 in one and the inside annular opening 10 may be blockaded with the annular outside elastic lip section 58 which constitutes the annular edge 6 Are turned up from the annular inside end section 59 of the main part section 55, and reduce the diameter gradually and it is extended. It is elastically in contact with the peripheral face 34 of the thin cylinder section 32, and the tips 60 which are the annular inside end section are the main part section 55 and the same axle, are formed in the inside end section 59 of the main part section 55 in one, and the annular inside elastic lip section 61 which constitutes the annular edge 7 is provided.

[0028] In the elastic seal means 11 the main part section 55 The elastic material 66 which consists of the core bar member 65, rubber, or a plastics elastomer is provided. An outside and the inside elastic lip sections 58 and 61 It consists of elastic material which consists of rubber or a plastics elastomer. The core bar member 65 Cover annular Itabe's 17 annular lateral surface 53 and annular end face 54 in the peripheral face 51 and annular end-face 52 list of a cylinder part 16 which are the external surface 5 of

lower housing 2, and contact these and it is extended. It is covered by the elastic material 66, and the elastic material of an outside and the inside elastic lip sections 58 and 61 is extended from the elastic material 66 which covered the core bar member 66, and is in one with the elastic material 66 concerned. Each of an outside and the inside elastic lip sections 58 and 61 is formed so that it may become heavy-gage, as it goes at a tip.

[0029] The piston rod 36 of the shock absorber in a strut assembly is made to insert in the insertion hole 37, as the plain bearing 1 made of the above synthetic resin is shown in drawing 5 . The upper surface 71 of upper housing 3 is made to contact exactly the attachment member 72 by the side of the body attached in the end of a piston rod 36. The cylindrical external surface 73 and the annular external surface 74 of the elastic seal means 11 are made to contact exactly the up spring seat sheet 76 of the coil spring 75 in a strut assembly through a washer 77, and it is equipped between the attachment member 72 and the up spring seat sheet 76, and is used.

[0030] If a strut assembly rotates by steering actuation, this rotation of lower housing 2 will be smoothly made by lower housing 2 rotating to upper housing 3 by the thrust plain bearing 42 and the radial plain bearing 44 which were allotted between the upper part, lower housing 3, and 2, therefore steering actuation will also be performed without resistance. Moreover, invasion of the dust through the outside and inside annular openings 9 and 10 to space 8 between the upper part, lower housing 3, and 2 etc. It is prevented in a periphery side by the outside elastic lip section 58, and is prevented by the inside elastic lip section 61 in an inner circumference side. It ** and invasion of the dust of between the protrusion circumferentia 45 and the sides 46 which it is between each sliding surface of the thrust plain bearing 42 and the radial plain bearing 44, and a between [the protrusion cylinder side 47 and peripheral faces 33] etc. is prevented certainly.

[0031] Namely, according to the plain bearing 1 made of synthetic resin Since an elastic seal means 11 to blockade the outside and inside annular openings 9 and 10 of space 8 between the upper part, lower housing 3, and 2 covers the peripheral face 51 which is the external surface 5 of lower housing 2, the annular end face 52, the annular lateral surface 53, and the annular end face 54 and is allotted at the edges 6 and 7 annular [both] If plain bearing 1 is attached between the attachment member 72 of the body, and the up spring seat sheet 76 of a coil spring 75 As a result of fixing the elastic seal means 11 to the washer 77 installed on the up spring seat sheet 76 or the up spring seat sheet 76 firmly, omission of the elastic seal means 11 can be prevented certainly. Moreover, with the seal means 11 concerned Invasion of the dust of between the protrusion circumferentia 45 and the sides 46 in the thrust plain bearing 42 and the radial plain bearing 44 and a between [the protrusion cylinder side 47 and peripheral faces 33] etc. can be prevented certainly. It produces the fall of the sliding property resulting from invasion of dust etc. and **, and smooth steering at the time of steering actuation can be maintained over a long period of time.

[0032] Moreover, since the annular inside and the outside elastic lip sections 61 and 58 are formed in the inside of the main part section 55 and the outside end sections 59 and 56 which covered annular Itabe's 17 annular lateral surface 53 and annular end face 54 in the peripheral face 51 and annular end-face 52 list of a cylinder part 16 according to plain bearing 1 By elastic contact to the inside, the inside of the upper housing 3 of the outside elastic lip sections 61 and 58, and the outside bodies 24 and 27, seal of the inside and outside annular openings 10 and 9 can be made nearly perfect.

[0033] In addition, in plain bearing 1, the elastic seal means 11 possesses the core bar member 65. An outside and the inside elastic lip sections 58 and 61 consist of elastic material, and the core bar member 65 which covered the external surface 5 of lower housing 2 is covered with the elastic material 66. Since an outside and the inside elastic lip sections 58 and 61 consist of elastic material extended in one from the elastic material 66 which covered the core bar member 65 It can arrange without hanging down the elastic seal means 11 from the external surface 5 of lower housing 2, and seal can be attained nearly completely as the outside which consists of elastic material, and the inside elastic lip sections 58 and 61 are moreover also. Furthermore, in plain bearing 1, since the slots 48 and 49 as a grease sump are formed, if grease is arranged and used for slots 48 and 49, it can continue and the further smooth steering at the time of steering actuation can be obtained at a long period of time.

[0034] By the way, in the above-mentioned plain bearing 1, although the plain-bearing means 4 was formed in lower housing 2 in one, it may replace with this, and as shown in drawing 6 and drawing 7, the plain-bearing means 4 may be formed in another object to lower housing 2 and upper housing 3. The plain bearing 1 shown in drawing 6 and drawing 7 possesses the plain-bearing means 4 formed in another object to lower housing 2 and upper housing 3. Namely, the bearing means 4 made of synthetic resin The annular thrust plain-bearing section 81 used as thrust plain bearing and the radial plain-bearing section 82 of the shape of a cylinder used as radial plain bearing formed in the thrust plain-bearing section 81 in one are provided. In one annular side 83 of the thrust plain-bearing section 81 A slot 46, two or more same slots 84, and the annular slot 85 that opened the end of a slot 84 for free passage, respectively are formed. The same slot 84 also as the annular side 86 of another side of the thrust plain-bearing section 81, The annular slot 85 which opened the end of a slot 84 for free passage, respectively is formed. To the inside-and-outside peripheral surfaces 87 and 88 of the radial plain-bearing section 82 A slot 49 and two or more same slots 89 and 90 are formed. The plain-bearing means 4 It contacts so that the side 83 of the thrust plain-bearing section 81 may be slid on the side 86 of the thrust plain-bearing section 81 to annular Itabe's 17 annular medial surface 41, respectively on annular Itabe's 25 side 46. The inner skin 87 of the radial plain-bearing section 82 contacts the peripheral face 33 of the thick-cylinder section 31 so that the peripheral face 88 of the radial plain-bearing section 82 may be slid to the inner skin 15 of a cylinder part 16, respectively, and it is allotted to it in the space 8 between lower housing 2 and upper housing 3.

[0035] Also by the plain bearing 1 possessing the plain-bearing means 4 as shown in drawing 6 and drawing 7, the same effect as the plain bearing 1 shown by drawing 4 can be acquired from drawing 1.

[0036]

[Effect of the Invention] According to this invention, with a seal means, invasion of the dust to a sliding surface etc. can be prevented certainly, the fall of the sliding property resulting from invasion of dust etc. is not produced, moreover, it ** by the ability equipping with a seal means easily, by vibration etc., so that there may be no dedropping, and plain bearing made of synthetic resin which can maintain smooth steering at the time of steering actuation over a long period of time can be offered.

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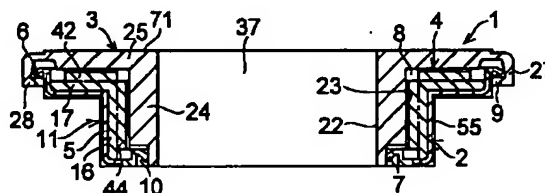
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(54)【発明の名称】 合成樹脂製の滑り軸受

(57)【要約】

【課題】 シール手段によって、摺動面への塵埃等の侵入を確実に防止し得て、塵埃等の侵入に起因する摺動特性の低下を生じさせることがなく、しかも、振動等によって容易に脱落しないようにシール手段を装着でき、而して、ステアリング操作時の円滑な操舵を長期間にわたって維持できる合成樹脂製の滑り軸受を得ること。

【解決手段】 合成樹脂製の滑り軸受1は、合成樹脂製の下部ケース2と、下部ケース2に重ねられた合成樹脂製の上部ケース3と、上部及び下部ケース2及び3間の空間8に配された合成樹脂製の滑り軸受手段4と、下部ケース2の外周面5を覆って配されており、両環状の端部6及び7で上部及び下部ケース2及び3間の空間8の外側及び内側環状開口9及び10を閉塞した弾性シール手段11とを具備している。



【特許請求の範囲】

【請求項1】 合成樹脂製の下部ケースと、この下部ケースに重ねられた合成樹脂製の上部ケースと、上部及び下部ケース間に配された合成樹脂製の滑り軸受手段と、下部ケースの外周面を覆って配されており、両環状の端面で下部及び上部ケース間の空間の外側及び内側環状開口を閉塞した弾性シール手段とを具備している合成樹脂製の滑り軸受。

【請求項2】 下部ケースは、円筒状の内周面を有した筒部と、この筒部の一端部に一体的に形成された第一の環状板部とを備えており、上部ケースは、下部ケースの筒部の内周面と同心な内周面及び外周面を有して、下部ケースの筒部に配された内側円筒部と、この内側円筒部の一端部に一体的に形成された第二の環状板部と、この第二の環状板部の環状外周端面に一体的に形成されており、下部ケースの筒部の内周面と同心な内周面を有した外側円筒部とを具備しており、弾性シール手段は、下部ケースの筒部の外周面及びこの外周面に接続する環状端面並びに第一の環状板部の環状外側面及びこの環状外側面に接続する環状端面を覆った本体部と、この本体部の外側一端部に一体的に形成されており、外側環状開口を閉塞する外側弾性リップ部と、本体部の内側一端部に一体的に形成されており、内側環状開口を閉塞する内側弾性リップ部とを具備している請求項1に記載の合成樹脂製の滑り軸受。

【請求項3】 滑り軸受手段は、下部ケースの第一の環状板部と上部ケースの第二の環状板部との間に配されたスラスト滑り軸受と、下部ケースの筒部と上部ケースの内側円筒部との間に配されたラジアル滑り軸受とを備えている請求項2に記載の合成樹脂製の滑り軸受。

【請求項4】 外側弾性リップ部は、その環状の外側一端部で、上部ケースの外側円筒部に弾性的に接触しており、内側弾性リップ部は、その環状の内側一端部で上部ケースの内側円筒部に弾性的に接触している請求項2又は3に記載の合成樹脂製の滑り軸受。

【請求項5】 弾性シール手段において、本体部は、心金部材を具備しており、外側及び内側弾性リップ部の夫々は、弾性材からなる請求項2から4のいずれか一項に記載の合成樹脂製の滑り軸受。

【請求項6】 心金部材は、下部ケースの筒部の外周面及び環状端面並びに第一の環状板部の環状外側面及び環状端面を覆って伸びて、弾性材に被覆されており、外側及び内側弾性リップ部の夫々の弾性材は、心金部材を被覆した弾性材から伸びて当該弾性材と一体的になっている請求項5に記載の合成樹脂製の滑り軸受。

【請求項7】 滑り軸受手段は、下部ケース及び上部ケースの少なくとも一方に一体的に形成されている請求項1から6のいずれか一項に記載の合成樹脂製の滑り軸受。

【請求項8】 滑り軸受手段は、下部ケース及び上部ケ

ースに対して別体に形成されている請求項1から6のいずれか一項に記載の合成樹脂製の滑り軸受。

【請求項9】 滑り軸受手段には、グリース溜めが形成されている請求項1から8のいずれか一項に記載の合成樹脂製の滑り軸受。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、合成樹脂製の滑り軸受に関し、更に詳しくは四輪自動車におけるストラット型サスペンション（マクファース式）に組込まれて好適な合成樹脂製の滑り軸受に関する。

【0002】

【発明が解決しようとする課題】四輪自動車の前輪に用いられるストラット型サスペンションは、一般に、主軸と一体的となった外筒の中に油圧式ショックアブソーバを内蔵したストラットアセンブリにコイルバネを組合わせた構造をもっている。斯かるサスペンションにおいては、ステアリング操作においてストラットアセンブリがコイルバネと共に回る際に、ストラットアセンブリのピストンロッドが回る形式と、ピストンロッドが回らない形式のものがあるが、いずれの形式においてもストラットアセンブリの回転を円滑に許容するべく、車体の取付部材とコイルバネの上部バネ座シートとの間に、転がり玉軸受に代えて、合成樹脂製の滑り軸受が使用される場合がある。

【0003】合成樹脂製の滑り軸受は、通常、合成樹脂製の下部ケースと、この下部ケースに重ねられた合成樹脂製の上部ケースとを具備し、これら下部ケースと上部ケースとの間の空間に滑り軸受部材又は滑り軸受突部を配してなるが、この空間に塵埃、泥水等が侵入すると、所望の軸受機能が得られなくなってしまう虞がある。一方、ストラット型サスペンションは、車輛走行中に塵埃、泥水などが直接作用する部位に装着されるため、車体の取付部材とコイルバネの上部バネ座シートとの間に装着される滑り軸受の使用環境も極めて過酷なものとなる。したがって、滑り軸受部材又は滑り軸受突部が配された空間の外周側及び内周側が直接外部に開口していると、ここからの塵埃、泥水などの空間への侵入の危険が極めて高くなり、ここでの密封性が極めて重要になる。特に、空間での水分等の滞留を防止するために、空間の内周側を下方に開口させて下部ケース及び上部ケースを形成した合成樹脂製の滑り軸受では、上記の危険がますます高くなる。

【0004】加えて、合成樹脂製の滑り軸受は、上記のように自動車の前輪等のきわめて振動の激しい部位に装着されるために、塵埃、泥水等の空間への侵入を防止するために当該空間の開口部を閉塞するシール手段に対しては、振動等によって容易に脱落しないように、それがしっかりと空間の開口部に装着されることが要求される。

【0005】本発明は、前記諸点に鑑みてなされたものであって、シール手段によって、摺動面への塵埃等の侵入を確実に防止し得て、塵埃等の侵入に起因する摺動特性の低下を生じさせることがなく、しかも、振動等によって容易に脱落しないようにシール手段を装着でき、而して、ステアリング操作時の円滑な操舵を長期間にわたって維持できる合成樹脂製の滑り軸受を得ることを目的とするものである。

【0006】

【課題を解決するための手段】本発明の第一の態様の合成樹脂製の滑り軸受は、合成樹脂製の下部ケースと、この下部ケースに重ねられた合成樹脂製の上部ケースと、上部及び下部ケース間に配された合成樹脂製の滑り軸受手段と、下部ケースの外面を覆って配されており、両環状の端部で下部及び上部ケース間の空間の外側及び内側環状開口を閉塞した弾性シール手段とを具備している。

【0007】第一の態様の滑り軸受によれば、両環状の端部で上部及び下部ケース間の空間の外側及び内側環状開口を閉塞する弾性シール手段が下部ケースの外周面を覆って配されているために、滑り軸受が車体の取付部材とコイルバネの上部バネ座シートとの間に取付けられると、弾性シール手段が上部バネ座シート又は上部バネ座シート上に設置される座金にしっかりと固定される結果、弾性シール手段の脱落を確実に防止でき、しかも、当該弾性シール手段によって、摺動面への塵埃等の侵入を確実に防止し得て、塵埃等の侵入に起因する摺動特性の低下を生じさせることがなく、而して、ステアリング操作時の円滑な操舵を長期間にわたって維持できる。

【0008】本発明の第二の態様の合成樹脂製の滑り軸受では、第一の態様の滑り軸受において、下部ケースは、円筒状の内周面を有した筒部と、この筒部の一端部に一体的に形成された第一の環状板部とを備えており、上部ケースは、下部ケースの筒部の内周面と同心な内周面及び外周面を有して、下部ケースの筒部に配された内側円筒部と、この内側円筒部の一端部に一体的に形成された第二の環状板部と、この第二の環状板部の環状外周端部に一体的に形成されており、下部ケースの筒部の内周面と同心な内周面を有した外側円筒部とを具備しており、弾性シール手段は、下部ケースの筒部の外周面及びこの外周面に接続する環状端面並びに第一の環状板部の環状外側面及びこの環状外側面に接続する環状端面を覆った本体部と、この本体部の外側一端部に一体的に形成されており、外側環状開口を閉塞する外側弾性リップ部と、本体部の内側一端部に一体的に形成されており、内側環状開口を閉塞する内側弾性リップ部とを具備している。

【0009】第二の態様の滑り軸受によれば、下部ケースの筒部の外周面及び環状端面並びに第一の環状板部の環状外側面及び環状端面を覆った本体部の内側及び外側一端部に環状の内側及び外側弾性リップ部が形成されて

いるために、この内側及び外側弾性リップ部の上部ケースの内側及び外側円筒部への弾力的な接触により、外側及び内側環状開口の密封をほぼ完全にできる。

【0010】本発明の第三の態様の合成樹脂製の滑り軸受では、第二の態様の滑り軸受において、滑り軸受手段は、下部ケースの第一の環状板部と上部ケースの第二の環状板部との間に配されたスラスト滑り軸受と、下部ケースの筒部と上部ケースの内側円筒部との間に配されたラジアル滑り軸受とを備えている。

【0011】第三の態様の滑り軸受において、スラスト滑り軸受は、第一の環状板部及び第二の環状板部のうちの少なくとも一方に一体的に形成しても、これに代えて、それらのうちの少なくとも一方に対して別体に形成してもよく、ラジアル滑り軸受も同様に、筒部及び内側円筒部のうちの少なくとも一方に一体的に形成しても、これに代えて、それらのうちの少なくとも一方に対して別体に形成してもよい。

【0012】本発明の第四の態様の合成樹脂製の滑り軸受では、第二又は第三の態様の滑り軸受において、外側弾性リップ部は、その環状の外側一端部で、上部ケースの外側円筒部に弾力的に接触しており、内側弾性リップ部は、その環状の内側一端部で上部ケースの内側円筒部に弾力的に接触している。

【0013】本発明の第五の態様の合成樹脂製の滑り軸受では、第二から第四のいずれかの態様の滑り軸受において、弾性シール手段の本体部は、心金部材を具備しており、弾性シール手段の外側及び内側弾性リップ部の夫々は、弾性材からなっている。

【0014】本発明の第六の態様の合成樹脂製の滑り軸受では、第五の態様の滑り軸受において、心金部材は、下部ケースの筒部の外周面及び環状端面並びに第一の環状板部の環状外側面及び環状端面を覆って伸びて、弾性材に被覆されており、外側及び内側弾性リップ部の夫々の弾性材は、心金部材を被覆した弾性材から伸びて当該弾性材と一体的になっている。

【0015】本発明の第五の態様の滑り軸受では、弾性シール手段が心金部材を具備し、外側及び内側弾性リップ部が弾性材からなり、第六の態様の滑り軸受では、下部ケースの外面を覆った心金部材が弾性材で被覆されて、外側及び内側弾性リップ部の夫々が心金部材を被覆した弾性材から一体的に延長された弾性材からなるために、弾性シール手段を下部ケースの外面に垂れることなしに配置でき、しかも、弾性材からなる外側及び内側弾性リップ部でもって外側及び内側環状開口の密封をほぼ完全に達成できる。弾性材としては、天然ゴム、合成ゴムなどのゴム弾性体あるいはポリエステル、ポリウレタンなどのプラスチックエラストマーが使用される。

【0016】本発明では、滑り軸受手段を、第七の態様の滑り軸受のように、下部ケース及び上部ケースの少なくとも一方に一体的に形成して設けても、第八の態様の

滑り軸受のように、下部ケース及び上部ケースに対して別体に形成して設けてもよく、ここで、滑り軸受手段を、スラスト滑り軸受とラジアル滑り軸受とから構成する場合には、第三の態様のように、これらをも下部ケース及び上部ケースの少なくとも一方に一体的に形成又は別体に形成して設けてよい。更に、滑り軸受手段には、第九の態様の滑り軸受のように、グリース溜めを形成してもよく、このグリース溜めにグリースを配して用いると、ステアリング操作時の更なる円滑な操舵を長期に亘って得ることができる。

【0017】本発明における上部及び下部ケースを構成する合成樹脂は、耐摩耗性、耐衝撃性、耐クリープ性等の摺動特性及び機械的特性に優れていることが好ましく、また上部及び下部ケース間に配される滑り軸受手段を構成する合成樹脂は特に自己潤滑性を有することが好ましく、例えばポリアセタール樹脂、ポリアミド樹脂、ポリブチレンテレフタレート (PBT) 等のポリエステル樹脂、ポリエチレン、ポリプロピレン等のポリオレフィン樹脂等が良好に使用され、このほかポリカーボネート樹脂等も使用し得る。

【0018】上部及び下部ケースには、滑り軸受手段を構成する合成樹脂と同様の合成樹脂が使用され得るが、特に滑り軸受手段に使用される合成樹脂と摩擦特性の良好な組合わせであって、しかも比較的剛性の高い合成樹脂であることが望ましい。その望ましい組合わせについて例示すると、滑り軸受手段と上部及び下部ケースとに対して、ポリアセタールとポリアミドとの組み合わせ、ポリエチレンとポリアセタールとの組み合わせ、ポリアセタールとPBTとの組み合わせ及びポリアセタールとポリアセタールとの組み合わせがある。

【0019】なお、外側及び内側環状開口の少なくとも一方に、ラビリンスシール手段を更に設けて、このラビリンスシール手段と弾性シール手段との協同により、外周側及び内周側の少なくとも一方の密封性を更に向上させてもよい。

【0020】次に本発明を、図に示す好ましい実施の形態の例に基づいて更に詳細に説明する。本発明はこれら例に何等限定されないものである。

【0021】

【実施の形態】図1から図4において、本例の合成樹脂製の滑り軸受1は、合成樹脂製の下部ケース2と、下部ケース2に重ねられた合成樹脂製の上部ケース3と、上部及び下部ケース2及び3間の空間8に配された合成樹脂製の滑り軸受手段4と、下部ケース2の外周面5を覆って配されており、両環状の端部6及び7で上部及び下部ケース2及び3間の空間8の外側及び内側環状開口9及び10を閉塞した弾性シール手段11とを具備している。

【0022】下部ケースは2、円筒状の内周面15を有した筒部16と、筒部16の一端部に一体的に形成され

た環状板部17とを備えている。

【0023】上部ケース3は、下部ケース2の筒部16の内周面15と同心な内周面22及び外周面23を有して、下部ケース2の筒部16内に配された内側円筒部24と、内側円筒部24の一端部に一体的に形成された環状板部25と、環状板部25の環状外周部に一体的に形成されており、下部ケース2の筒部16の内周面15と同心な内周面26を有した外側円筒部27と、外側円筒部27の内周面26に、径方向内方に突出して一体的に形成された環状突起28とを備えている。

【0024】内側円筒部24は、厚肉円筒部31と薄肉円筒部32とからなり、外周面23は、厚肉円筒部31の外周面33と薄肉円筒部32の外周面34とからなる。内側円筒部24の内周面22は、図5に示すストラットアセンブリのピストンロッド36が挿着される挿通孔37を規定している。

【0025】滑り軸受手段4は、下部ケース2の環状板部17と上部ケース3の環状板部25との間に配されて、環状板部17の環状内側面41に、軸方向に突出して一体的に形成された環状のスラスト滑り軸受42と、下部ケース2の筒部16と上部ケース3の内側円筒部24との間に配されて、筒部16の内周面15に、径方向内方に突出して一体的に形成された円筒状のラジアル滑り軸受44とを備えており、スラスト滑り軸受42の突出環状面45は、環状板部25の一方の環状の側面(環状内面)46に摺動自在となるように接触しており、ラジアル滑り軸受44の円筒状の突出円筒面47は、厚肉円筒部31の円筒状の外周面33に摺動自在となるように接触している。

【0026】滑り軸受手段4において、突出環状面45には、放射方向に伸びるグリース溜めとしての複数本の溝48が、突出円筒面47には、軸方向に伸びる同じくグリース溜めとしての複数本の溝49が夫々角度方向に等間隔に形成されている。

【0027】弾性シール手段11は、下部ケース2の筒部16の円筒状の外周面51及び外周面51に接続する環状端面52並びに環状板部17の環状外側面53及び環状外側面53に接続する環状端面54を覆った本体部55と、外側環状開口9を閉塞するように、本体部55の環状の外側一端部56から折り返されて徐々に拡張して伸びて、環状の外側一端部である先端57が外側円筒部27の内周面26に弾性的に接触しており、本体部55と同軸であって本体部55の外側一端部56に一体的に形成されて、環状の端部6を構成する環状の外側弾性リップ部58と、内側環状開口10を閉塞するように、本体部55の環状の内側一端部59から折り返されて徐々に縮径して伸びて、環状の内側一端部である先端60が薄肉円筒部32の外周面34に弾性的に接触しており、本体部55と同軸であって本体部55の内側一端部59に一体的に形成されて、環状の端部7を構成する環

状の内側弾性リップ部61とを具備している。

【0028】弾性シール手段11において、本体部55は、心金部材65とゴムあるいはプラスチックエラストマーからなる弾性材66とを具備しており、外側及び内側弾性リップ部58及び61は、ゴムあるいはプラスチックエラストマーからなる弾性材からなり、心金部材65は、下部ケース2の外周面5である筒部16の外周面51及び環状端面52並びに環状板部17の環状外側面53及び環状端面54を覆って且つこれらに接触して伸びて、弾性材66に被覆されており、外側及び内側弾性リップ部58及び61の弾性材は、心金部材66を被覆した弾性材66から伸びて当該弾性材66と一体的になっている。外側及び内側弾性リップ部58及び61の夫々は、先端に向かうに従って厚肉となるように形成されている。

【0029】以上の合成樹脂製の滑り軸受1は、図5に示すように、ストラットアセンブリにおけるショックアブソーバのピストンロッド36を挿通孔37に挿通させ、上部ケース3の上面71を、ピストンロッド36の一端が取り付けられる車体側の取付部材72にぴったりと当接させ、弾性シール手段11の円筒状外周面73及び環状外周面74を、ストラットアセンブリにおけるコイルバネ75の上部バネ座シート76に座金77を介してぴったりと当接させて、取付部材72と上部バネ座シート76との間に装着されて用いられる。

【0030】ステアリング操作によりストラットアセンブリが回転されると、上部ケース3に対して下部ケース2が回転され、下部ケース2のこの回転は、上部及び下部ケース3及び2間に配されたスラスト滑り軸受42及びラジアル滑り軸受44により滑らかになされ、したがってステアリング操作も抵抗なく行われる。また、上部及び下部ケース3及び2間の空間8への外側及び内側環状開口9及び10を介する塵埃等の侵入は、外周側では外側弾性リップ部58により、内周側では内側弾性リップ部61により防止され、而してスラスト滑り軸受42及びラジアル滑り軸受44の各摺動面間である突出環状面45と側面46との間及び突出円筒面47と外周面33との間への塵埃等の侵入が確実に防止される。

【0031】すなわち、合成樹脂製の滑り軸受1によれば、両環状の端部6及び7で上部及び下部ケース3及び2間の空間8の外側及び内側環状開口9及び10を閉塞する弾性シール手段11が下部ケース2の外周面5である外周面51、環状端面52、環状外側面53及び環状端面54を覆って配されているために、滑り軸受1が車体の取付部材72とコイルバネ75の上部バネ座シート76との間に取付けられると、弾性シール手段11が上部バネ座シート76又は上部バネ座シート76上に設置される座金77にしっかりと固定される結果、弾性シール手段11の脱落を確実に防止でき、しかも、当該シール手段11によって、スラスト滑り軸受42及びラジアル

滑り軸受44における突出環状面45と側面46との間及び突出円筒面47と外周面33との間への塵埃等の侵入を確実に防止し得て、塵埃等の侵入に起因する摺動特性の低下を生じさせることがなく、而して、ステアリング操作時の円滑な操舵を長期間にわたって維持できる。

【0032】また滑り軸受1によれば、筒部16の外周面51及び環状端面52並びに環状板部17の環状外側面53及び環状端面54を覆った本体部55の内側及び外側一端部59及び56に環状の内側及び外側弾性リップ部61及び58が形成されているために、内側及び外側弾性リップ部61及び58の上部ケース3の内側及び外側円筒部24及び27への弾力的な接触により、内側及び外側環状開口10及び9の密封をほぼ完全にできる。

【0033】加えて滑り軸受1では、弾性シール手段11が心金部材65を具備し、外側及び内側弾性リップ部58及び61が弾性材からなり、下部ケース2の外周面5を覆った心金部材65が弾性材66で被覆されて、外側及び内側弾性リップ部58及び61が心金部材65を被覆した弾性材66から一体的に延長された弾性材からなるために、弾性シール手段11を下部ケース2の外周面5から垂れることなしに配置でき、しかも、弾性材からなる外側及び内側弾性リップ部58及び61でもって密封をほぼ完全に達成できる。更に滑り軸受1では、グリース溜めとしての溝48及び49が形成されているために、溝48及び49にグリースを配して用いると、ステアリング操作時の更なる円滑な操舵を長期に亘って得ることができる。

【0034】ところで上記の滑り軸受1では、滑り軸受手段4を下部ケース2に一体的に形成したが、これに代えて、図6及び図7に示すように滑り軸受手段4を下部ケース2及び上部ケース3に対して別体に形成してもよい。すなわち図6及び図7に示す滑り軸受1は、下部ケース2及び上部ケース3に対して別体に形成された滑り軸受手段4を具備しており、合成樹脂製の軸受手段4は、スラスト滑り軸受となる環状のスラスト滑り軸受部81と、スラスト滑り軸受部81に一体的に形成されたラジアル滑り軸受となる円筒状のラジアル滑り軸受部82とを具備しており、スラスト滑り軸受部81の一方の環状の側面83には、溝46と同様の複数の溝84と、溝84の一端を夫々連通した環状の溝85とが形成されており、スラスト滑り軸受部81の他方の環状の側面86にも、同様の溝84と、溝84の一端を夫々連通した環状の溝85とが形成されており、ラジアル滑り軸受部82の内外周面87及び88には、溝49と同様の複数の溝89及び90が形成されており、滑り軸受手段4は、スラスト滑り軸受部81の側面83が環状板部25の側面46に、スラスト滑り軸受部81の側面86が環状板部17の環状内側面41に夫々摺動自在となるように接触し、ラジアル滑り軸受部82の内周面87が厚肉

円筒部31の外周面33に、ラジアル滑り軸受部82の外周面88が筒部16の内周面15に夫々摺動自在となるように接触して、下部ケース2及び上部ケース3との間の空間8に配されている。

【0035】図6及び図7に示すような滑り軸受手段4を具備した滑り軸受1でも、図1から図4で示される滑り軸受1と同様な効果を得ることができる。

【0036】

【発明の効果】本発明によれば、シール手段によって、摺動面への塵埃等の侵入を確実に防止し得て、塵埃等の侵入に起因する摺動特性の低下を生じさせることがなく、しかも、振動等によって容易に脱落しないようにシール手段を装着でき、而して、ステアリング操作時の円滑な操舵を長期間にわたって維持できる合成樹脂製の滑り軸受を提供できる。

【図面の簡単な説明】

【図1】本発明の好ましい実施の形態の一例の断面図である。

【図2】図1に示す例の一部拡大断面図である。

【図3】図1に示す例の弾性シール手段の拡大断面図である。

【図4】図1に示す例の下部ケースと滑り軸受手段との斜視図である。

【図5】図1に示す例をストラットアセンブリに用いた例の断面図である。

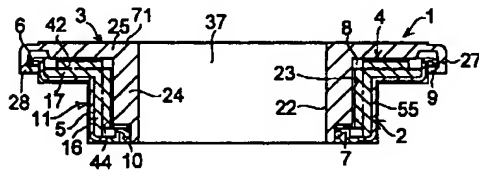
【図6】本発明の好ましい実施の形態の他の例の断面図である。

【図7】図6に示す滑り軸受手段の斜視図である。

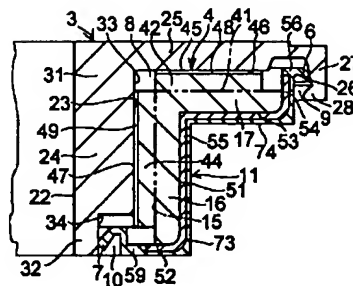
【符号の説明】

- 1 合成樹脂製の滑り軸受
- 2 下部ケース
- 3 上部ケース
- 4 滑り軸受手段
- 8 空間
- 9 外側環状開口
- 10 内側環状開口
- 11 弾性シール手段

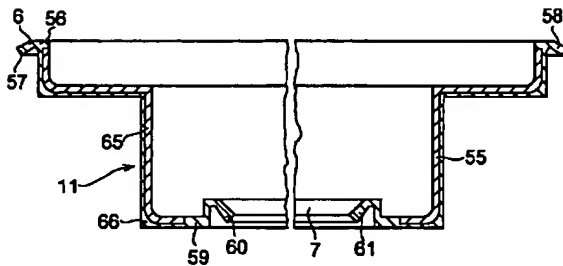
【図1】



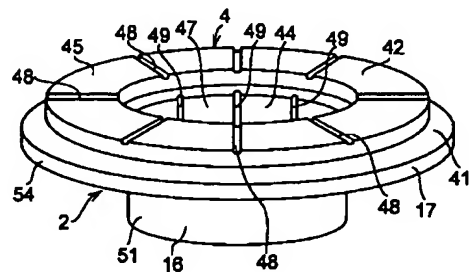
【図2】



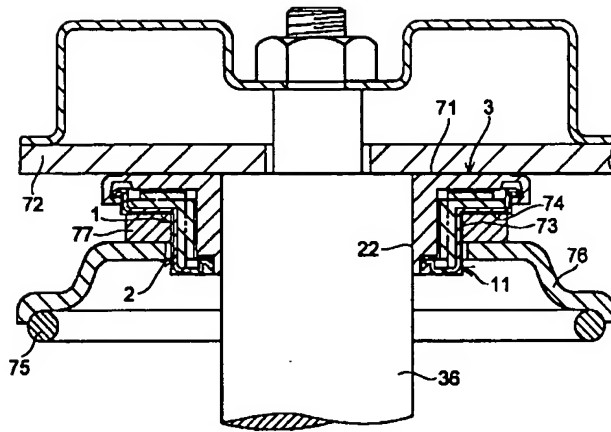
【図3】



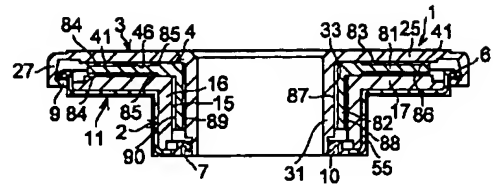
【図4】



【図5】



【図6】



【図7】

